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EDITOR'S MEMO PAD

Every business executive realizes that in any type of endeavor there can be no such thing as standing still. Every business or organization either moves forward or it will certainly slip behind. He also recognizes that advancement of any kind calls not only for planning and foresight, but for a careful reconnaissance and analysis of the involved field, as well.

This we believe, to be equally true in any type of journalistic effort, whether it be large or small. Should any of our readers trouble themselves to make a comparison of the many magazines with which they are familiar today, with those of similar character of a quarter of a century ago, they will immediately be impressed with the great change which has come about in the sphere of the literary world.

Even the most skeptical must admit readily that these changes have for the most part been an improvement over the old style and order. If by chance, you have not noticed the so called "new look" in the present issue of *EARTH SCIENCE DIGEST*, we are now calling your attention to it. This has come about due to the fact that we are exploring new ideas and making plans for developing a more attractive format for the *DIGEST* in the near future.

While we are not expecting to effect any radical change at once, we hope to make a gradual transition into a more modern and attractive magazine that will perhaps have greater eye-appeal and give more enjoyment to our readers.

We have frequently been asked why our present volumes begin with July and not with January, which would be the normal procedure. The January beginning would be of particular benefit to libraries, as it would make their cataloguing easier. This all came about through our midyear start when two years ago we took over and revived the publication of the magazine. To obviate this objection we now plan to carry our present volume through to January 1955 as Volume VII, Nos. 7, 8, and 9, and to start volume VIII with the January issue. This will turn the trick and we hope will be of no great inconvenience to anyone. Beginning with Volume VIII, we

also plan to number our pages straight through the year, as this appears to be the most approved and convenient system for a magazine of this type.

The Authors

JOHN F. MIHELICIC, the author of the leading article in this issue, is a "wheel horse" in the earth science movement, and his outstanding contributions to its welfare are far too numerous to mention. Incidentally, his charming and efficient wife Lillian, who has served the Midwest Federation as secretary, and her own society in various capacities, is not far behind him. They reside in Detroit and are among the founders of the Michigan Mineralogical Society. John, who is a school man by profession, is also a past president of the Midwest Federation. He is an authority upon the minerals and collecting fields of the entire Michigan area, and is also widely traveled and informed on localities over the entire West. His own private collection is one of the most outstanding in the country, and we are indeed fortunate to count him among our valued friends. HIRAM L. KENNICOTT is a Chicago insurance executive, a graduate of the University of Chicago, and a trustee of the Chicago Academy of Sciences, of which Robert Kennicott, mentioned in his article, was a founder and the first director. DR. H. W. KUHN, of Milwaukee, is an eminent dentist by profession and an ardent geologist and collector of fossils (particularly trilobites) by avocation. P. Dykgraaf-Exner writes from Anna Paulownastraat 68, Den Haag, Holland. RUSSELL A. E. MORLEY is a research geologist, whose address is 399 North 18th Street, Salem, Oregon. MR. JULIAN WETHERBEE resides at 22 Wheelock Street, Keene, New Hampshire, and writes that she enjoys calls from visiting Rockhounds.

The Cover Picture

This picture was sent us by BOB KENYON, to accompany his fine story of Matt Macek and his millstones, but we liked it so well we could not resist putting it on the front cover.

—BEN HUR WILSON, *Editor*

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THREE STUDENTS of the Evanston (Illinois) High School, Carol Jean Gansz, 17; Janet C. Roundtree, 16; and Harold N. Ward, 17; recently won all expense trips to Washington to take part in a five day competition, for \$11,000 in college scholarships. The awards are made by the Westinghouse corporation. Ward's project, in this annual science talent search, is of special interest to us for two reasons. First for the excellence and perfection of the work done on crystal models, and second because he is the son of the late Dr. Harold B. Ward, assistant professor of Geology and geography at Northwestern University, and Mrs. Elizabeth B. Ward, business manager of the Evanston Y.W.C.A.

ULTRA-VIOLET PRODUCTS, INC., So. Pasadena, California, has just completed an addition to its plant, doubling its floor space. It is the West's largest manufacturer of ultra-violet lights and the sole manufacturer of the Mineralight, used in tungsten prospecting and ore sorting. The company's Blak-Ray inspection lamps are in demand for industrial use. The display room, open to the public, is worth a visit. Here is a collection from all over the world of fluorescent mineral specimens. The company's president, Mr. Tom Warren, can rank as the world's biggest rockhound, with a collection weighing more than 40 tons!

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Collecting Michigan Minerals

by JOHN F. MIHELIC

THE MINERAL COLLECTOR is in his element at almost any point in Michigan. Starting from the Ohio state line, he has about 700 miles of driving before he leaves Ironwood in the northwest section and may be collecting minerals all the way. The Lower Peninsula will yield specimens that are common to sedimentary deposits, while the Upper Peninsula affords the much greater range of minerals in sedimentary and igneous areas. Add to these, the contents of the glacial drift, and opportunities do present themselves all the way.

The first step in any field trip is to visit the public museums in the region you plan to explore. Then it is to your advantage to contact members of local mineralogical societies to see the methods they employ in collecting and displaying. All this presupposes that you have read available literature. You now know what to look for, where it may be found, and from whom you may secure permission to enter upon private property.

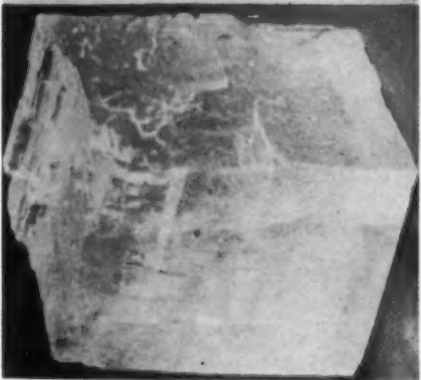
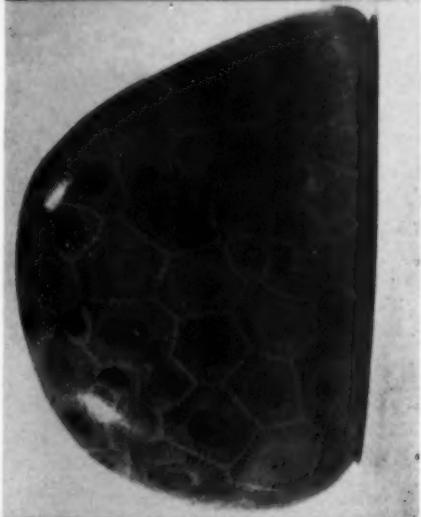
The Michigan Mineralogical Society, as a unit, and members individually have covered most parts of the state. One of their favorite sources of minerals in dolomite is the France Stone Company's quarry at Monroe, about 40 miles south of Detroit. Scalenohedrons of golden colored calcite are the most sought for. In addition, calcite of a colorless variety and fine coatings of iridescent marcasite are present. At Rockwood, imbedded in a dazzling white sandstone, you may find pale yellow calcite with thick crystals of celestite. At Detroit, the cleavages of clear rock salt are obtainable

at the International Salt Company mine. A large number of gravel pits about Detroit yield a surprising variety of minerals.

Gypsum deposits which are accessible to the collector are located at Grand Rapids, Alabaster, and National City in the Lower Peninsula, and at Point Aux Chene near St. Ignace in the Upper Peninsula. The deposit at Grand Rapids is worked from an adit penetrating a hill side. The others are quarry operations. The Grand Rapids mine yields masses of solid salmon colored alabaster, pencil ore, and at times, small vugs of sparkling selenite crystals. Large crystals of selenite are rare. The Alabaster quarry offers gypsum in a variety of forms—solid alabaster (I have turned several bowls and others have done intricate carvings of it), sheets of attractive salmon colored selenite, white pencil ore, and nodules of selenite coating core of alabaster, the selenite at times coming in dainty crystals. The quarry at National City has a similar variety of gypsum.

The best Pennsylvanian fossils are found at Grand Lodge in open pits in coal measure. Clay ironstone nodules from this quarry contain sphalerite and marcasite.

The most brilliant marcasite and fine calcite crystals come from the Cheney quarry near Belleville (Battle Creek area). Going due west to the Lake Michigan dunes area, you may find fulgurites. Continuing north to the Petoskey region you encounter a reef from Michigan's coral seas. This covers the region to Alpena. The "petoskey stone" may be found along the shores of Lake Michigan, Lake Huron, and



FROM MR. MIHELICIC'S COLLECTION: *left*, Cleavage Block of Crystal Rock Salt (Halite) from Mines at Detroit; *center*, "Petoskey Stone" Pebble (polished) of Fossil Coral, found in abundance along the beaches at Petoskey and in glacial gravels over wide areas; *right*, Conglomerate Boulder of Huronian Age.

all the small lakes in between. Trilobites, crinoids, gastropods, favosites, and a host of other fossils are encountered on the eastern portion between Alpena and Rogers City. Anthraconite and marcasite concretions are found in the black shale, just south of Alpena.

All through the Lower Peninsula, a liberal peppering of the pretty jasper conglomerate boulders attracts the collector, but the concentration is greater in the area north of Tawas. Ask the farmers for permission to look over the rock piles. The white matrix and the red and brown entrapped pebbles form excellent material for the collector with a yen for polishing.

The Iron and Copper Countries of Michigan have produced some of the most exquisite mineral specimens in our national museums. The iron producing area centered at Ishpeming is readily accessible, and two well known collectors, Charles Hawes and Bob Markert, live there. If you'd like to build a suite of hematite and jasper slabs, just keep your eyes on every outcropping in that region. While Jasper Knob is the most famous example of jaspilite and projects upward in the city of Ishpeming to command the surrounding country, other knobs of the same material may be seen. Look for fresh breaks, for the surface may be weathered. At the various surrounding mining operations, you will encounter pyrite pseudomorphs, glittering micaceous hematite, magnetite, barite and other associated minerals.

Just a little northwest of Ishpeming, you will visit the non-producing gold mines of Michigan. The best known is the Ropes. At the Ropes, you will find green talc, verde antique marble, and a compact serpentine-asbestos that should polish. At the Michigan gold mine, you will pick up some nice porphyry. Last summer, Mrs. Tolson Radloff casually picked up an excellent gold specimen—it may be that you will do likewise.

Look over the mine dumps at Champion, and then continue down to Republic. Check the granite outcropping for garnet and



SELENITE CRYSTALS, plentiful in Michigan.

feldspar. The jaspilite at Republic will differ from that at Ishpeming. The pack sack should contain siderite, tourmaline, and quartz, by now. At Michigamme, you may add aphrosiderite garnets in chlorite, frequently penetrated with martite, grunerite, and staurolite. Other iron and quartz minerals occur in the Iron River-Crystal Falls region.

As you drive through the Ford Forest toward L'Anse, you will pass the little mill town of Alberta. About two miles from there (well concealed) is an old graphite mine that is strewn with pieces of graphite, and at times pyrite. Continuing into the forest, you will encounter outcroppings that may furnish pyrolusite and manganite, jaspilite, hematite, and quartz.

The best awaits you—and to prepare for it, visit the museum at the Michigan College of Mining and Technology at Houghton. Your collecting may extend from Ontonagon to the top of the Keweenaw Peninsula. Over 60 minerals await your discovery, but you will be content with less.

The beaches at Ontonagon, as well as those all along the peninsula, are apt to yield agate, adularia, prehnite, copper, and jaspers. The Mass mine dump may give up some datolite and considerable tenorite with chrysocolla. The dumps at Painesdale and Trimountain have considerable calcite, copper, and epidote. The calcite is readily

freed from the copper, leaving a very attractive surface.

The dump at Baltic is wonderful. Despite the fact that it has been combed with vigor, its very size insures your getting nice specimens of chalcocite, bornite, chalcopyrite, laumontite, saussurite, epidote, ankerite, and many more. Close by is the quarry at



CASE with part of Mr. Mihelcic's collection of Michigan Minerals—many of them choice museum pieces.



JOHN F. MILHELIC

South Range, which furnishes good compact saussurite that polishes very well. The thomsonite found here is not very compact. The Atlantic mine produced some Paul Bunyan sized pieces of mass copper. The Isle Royale mines are next. On the bluff, overlooking Portage Lake, good compact laumonite and the unusual iddingsite are present.

The Quincy mine produced the most attractive nodules of porcelanic datolite, but your chance to find any there now is very slim indeed. But there still is good collecting of copper bearing rock. Prehnite and crystal quartz may occur in the old mine dumps along the way to Laurium. Some of the nicest quartz and epidote specimens came from the Osceola mine. Other dumps that are sources of the quartz and epidote are the Wolverine and the Ojibway. The Wolverine is apt to furnish beautiful specimens of crystallized epidote in cavities in the trap rock. In other cases these cavities are filled with red microcline surrounding a core of white calcite.

Domeykite is a prized mineral, attractive as a specimen and as a polished gem or slab. It is a copper arsenide that is found at Ahmeek and Mohawk, and is

readily identified by its silvery appearance when freshly fractured, and by a bronzy oxidation. The white of the quartz, with which it is intimately associated, sets off the surrounding domeykite.

The Allouez mine dump is an excellent source of the bluish-green chrysocolla, cuprite, tenorite and quartz intermingled. Some of this lends itself to polishing. Prehnite and quartz, shot through with copper, is the best bet at the Iroquois. The old Cliff mine was the source of glassy clear apophyllite, so the climb up the cliff may be worth your while, as more than just an elevation from which a fine panoramic view presents itself. The nearby Phoenix dump is worth exploration.

The Copper Falls dump lies well hidden and requires a quarter mile hike, but it is well worth the searching out. Here you are apt to find attractive zeolite specimens. Analcite and natrolite are the best bet. The fortunate one may find crystallized datolite. The specimens will not be large but they are apt to satisfy the most fastidious collector. The Clark mine is still a source of datolite nodules — as is the Delaware.

Agate collecting is general along the shoreline, with pickings slim. Also a chance to uncover a vug of amethyst in the area north of Copper Harbor, but it's just a chance. Silver is another rarity and is best obtained by local purchase, for it rarely winds up on a dump.

The southern area of the Upper Peninsula offers little actual collecting. The marble at the Metropolitan quarry near Randville is one point. Others are confined to the iron mining areas. Since these are deep mines, specimens come to the collector from a miner or dealer. The Ironwood area produces the most interesting specimens.

GRIEGER'S have installed a new G.E. air conditioner in their store at 1633 East Walnut Street, Pasadena, California, to make it more comfortable for their customers to shop for jewelry and gem cutting supplies.

Island in The Prairie

by HIRAM L. KENNICOTT

THOUSANDS OF YEARS AGO, Lake Chicago, as the geologists call it, covered what is now Chicago and its environs.

When the waters receded, islands of sandstone and limestone were exposed, some of the larger of which, such as Blue Island and Stony Island, are still well-known place names in the area.

Early settlers sometimes called any of the groves that stood out here and there in the swampy prairie, islands.

And islands in the prairie they were, whether or not they had been among the smaller islands of Lake Chicago. It has been said perhaps mistakenly that they were originally islands in the real sense, and became groves because their soil of rocky origin supported forest trees that would not grow in the swampy soil of the prairie.

This is the story of one of those islands in the prairie, The Grove. It comprises a square mile of woodland, rising gradually 22 feet above Milwaukee road, by which road it is 18 miles from the center of Chicago.

Here in 1836 settled Dr. John A. Kennicott, who some years later wrote: in the "Proceedings of the North American Pomological Convention; 1849":

"It should be borne in mind that our State extends through more than five degrees of latitude; and that the general aspect and character of the country, though somewhat diversified, is very unlike any of the older States. Its great and distinguishing, or generic features, are its prairies. They extend with few interruptions from Lake Michigan to the Mississippi, west and south, and are the principal lands devoted to cultivation in the State of Illinois.

"We have no mountains, and few elevations of sensible note. We are in the habit when speaking of our lands, of dividing them in the first place, into timber and prairie lands. The timbered lands are

again known as river bottoms, groves, burr-oak openings, and barrens. The prairies are known as wet and dry—or high and low—and level or rolling prairies.

"The river bottoms are often composed of deep alluvial deposits and rich natural soils, left from the subsidence of the waters, when our great lakes abandoned their southern outlet; and perhaps annual additions from floods, and from the vegetable accretions of unknown years since that event. But much of the timber lands near the streams are of a different and less desirable order, ranging from those which produce the burr-oak, hickory, butternut, black-walnut, and bass-wood, to those covered with the white and black oak. The former of these are always good; the latter generally poor, and often barren, and worthless for agricultural purposes.

"It is worthy of note that timber is always found on the easterly side of the streams in the prairie country; and where you find natural timber, there you will find water more or less permanent and abundant.

"The groves or islands, as they are fancifully called by the old squatters, are scattered over the whole face of the country, and are the only landmarks, and the most beautiful feature of prairie land, as God made it. The groves are in size from the solitary cluster of trees that you might count in a breath up to those of miles in extent, and furnishing fire-wood and fencing for hundreds of prairie farms.

"The soil of the groves is, in general, better than that near the lakes and streams, (the alluvion excepted), partaking more of the nature of the surrounding prairie."

The Grove got its name from the portage known as The Grove Portage that crossed it between the headwaters of the north branch of the Chicago River and the Des Plaines River. Customarily it would have been called Portage Grove, in the

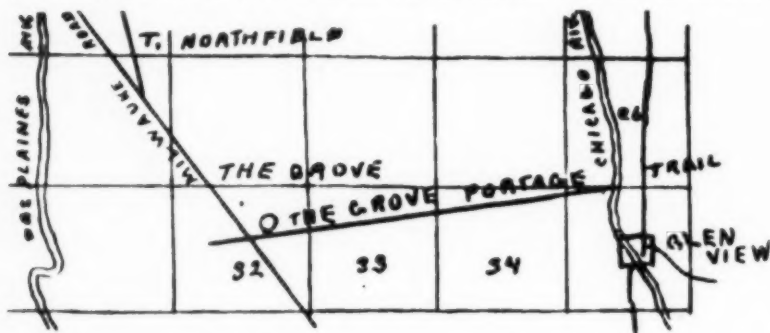
manner of nearby Morton Grove, Independence Grove (now Libertyville) and others. But for some reason it has remained known to this day as simply The Grove, particularly by the dozen families of Kennicott origin who have homes in part of it.

The portage of some four miles had been used by the Indians and French explorers since time immemorial. The hunters and trappers who followed them called

is the old homestead of the Kennicotts, taking its name from The Grove Portage of the Indians. A portage trail from the Chicago River west to this Grove, a distance of four miles, is visible just north of the Amasa Kennicott house. The Grove was used for camping. The canoes were set in the backwater of the Des Plaines River which reached in early times nearly to the Milwaukee Road. Here we have another



THE GROVE PORTAGE trail was north (left in the picture) of this house built by Amasa Kennicott. His son Walter, who has lived there some eighty years, points out an ancient three-pronged oak tree that his father said marked the trail.



it the Grove Portage, because The Grove was halfway between the rivers and they rested there from the heavy work of carrying their canoes.

The accompanying sketch-map and following text by Albert F. Scharf, 1902, are from a manuscript in the library of the Evanston (Illinois) Historical Society:

"The Grove in Sec. 32, town Northfield,

instance of the same path being used by man as well as the wild animals of the forest, this being the deer trail from the Skokie [headwaters of the Chicago River] to the Des Plaines."

On one of their jaunts this autumn the Friends of our Native Landscape will follow this portage trail, stopping to visit at The Grove the home of the author of these

lines, built in 1856 by Dr. John A. Kennicott, father of Amasa. Another of his sons was the naturalist, Robert Kennicott, who collected in British America (now Alaska) for the Chicago Academy of Sciences and the Smithsonian Institution in 1859-1862, and who died in the Yukon in 1866 while leading the scientific section of the Western

Union expedition to establish a telegraph line between America and Europe.

It is interesting to note that the crest of the island on which stand the old Kennicott houses is a sub-continental divide, the water draining east to the Gulf of St. Lawrence and west to the Gulf of Mexico.

Glacial Potholes in Minnesota and Wisconsin

by DR. H. W. KUHM

THOSE READERS who enjoyed Roger L. Spitznas' article on "Pothole Erosion" in the July, 1953, issue of the DIGEST, in which he described the potholes scoured into granodiorite along Little Kinshew Creek near Ramsey Bar, Butte County, California, will be interested to learn that excavations made on the Minnesota side at the dalles of the St. Croix River at Interstate Park disclose the largest glacial potholes in America. These great cistern holes have been bored in solid Keeweenawan trap rock

The rock ledges at the dalles are ancient lava flows. The lava or traps are well jointed, so that there are vertical precipices and isolated crags along the St. Croix River. The dalles record a primer lesson in geology. Here has been left legibly written the record of the glaciers when America was in the making. After this flow of lava rock had formed in this vicinity, a glacier nosed its way down from the north dragging with it large deposits of granite rock. When the glacier melted, a mighty river was formed,



LOCALE OF FAMOUS DALLES POTHOLES

by whirlpools of some ancient, mighty river which swirled and rotated the rocks like a grinding millstone. This action took place some time following the Glacial Period.

which carried the granite boulders along until they were snagged in some crevice of the softer trap rock formations. So powerful was the river at places that whirlpools were formed, which rotated the rocks, cut-

ting deep potholes into the softer material.

While the presence of these enormous potholes had been known, their depth was not ascertained until some of the water and debris had been cleaned from the cistern holes. The debris from these potholes shows great granite boulders which have been whirled in the basin so long that they have become spherical like a ball. Some of these granite boulders are three or four feet in diameter. There are probably forty potholes, large and small, within the confines of the Wisconsin-Minnesota joint park area.

On the edge of one of these enormous holes, on the Minnesota side the following sign has been posted: "GLACIAL KETTLE. So far as is known this is the largest and deepest glacial kettle in America. It has been bored in solid rock by the action of a mighty river grinding a hard granite rock against the softer trap rock. This kettle is twelve feet in diameter at the mouth. At a depth of 42 feet it is 15 feet in diameter. At its base, which is 63 feet from its mouth, the diameter is three feet. The base of this kettle is 25 feet below the level of the St. Croix River, which is only a few rods away."

Situated about 50 miles northeast of St. Paul on U. S. highway 8 and state highway 87, Interstate Park is located along the scenic Dalles of the St. Croix River, near the village of St. Croix Falls. Here, in northwestern Wisconsin, where the St. Croix River cuts through a gorge in the Keeweenawan trap rock, 581 acres of some of Wisconsin's most beautiful scenery are preserved. The park stretches for miles along the winding river through a fascinating region of beautiful woodlands, soaring cliffs, and strange geological formations. Red cliffs and pine-grown terraces hang above the seething stream. Bold rock ledges mark the St. Croix area. The wave-cut edges on these rocks show that in ages long past flowed a mightier river than now traverses the valley. Geologists claim that before the glacial period the St. Croix River probably lay to the west in the state of Min-

nesota, and followed a different course all the way to the Mississippi.

There are several remarkable geological formations in the park. The Old Man of the Dalles, a grim rock profile, tops the Wisconsin bank where the river turns southwest. Farther downstream, two slender red shafts, the Devil's Chair, spire high above the Minnesota side. And on both banks, far above the present water level, are the glacial potholes, or kettles, ground by



ONE OF THE WELLS at The Dalles of the St. Croix, Interstate Park, Taylor's Falls, Minnesota.

spherical boulders that were swirled about in rock crevices by prehistoric rapids.

Excellent camping and picnicking facilities make Interstate Park a favorite for visitors. Bathing, climbing, and other outdoor recreations can be enjoyed here. The entire park area is well wooded, and visitors may enjoy the natural wild condition of the St. Croix valley, and remarkable views of river and gorge scenery which are awe-inspiring.

The Oldest Paintings in the World

by P. DYKGRAAF - EXNER

THE CAVE OF ALTAMIRA was discovered in 1875 and the story of this discovery is quite interesting.

It was found by a fox-hunter when he tried to dig his dog out of a very deep fox-hole. The entrance of the cave had been buried under large pieces of rock which had tumbled down thousands of years ago, so it had never been seen. The hunter reported this find to his master, Don M. de Sautuelo, who was the owner of the place and who was interested in prehistoric research. He had the entrance cleared, then went down and examined the interior. Who can imagine his surprise when he saw the ceiling of a low cavern not far from the entrance covered with big, beautiful paintings in colours, red, yellow, black and white, all of which represented the wild animals, herein described. The pictures were so perfect and the colours were so fresh, it seemed like they had just been painted. He could not believe his eyes, because he understood, that the cave having been closed thousands of years ago, these pictures must have been painted before that time.

So he made copies of the pictures and sent them to some of the prominent paleologists, inviting them to come and examine this amazing find.

The photograph No. 1 of a bison, shows an example of these famous oldest pictures which can still be seen in the cave of Altamira near Santander in the north of Spain.

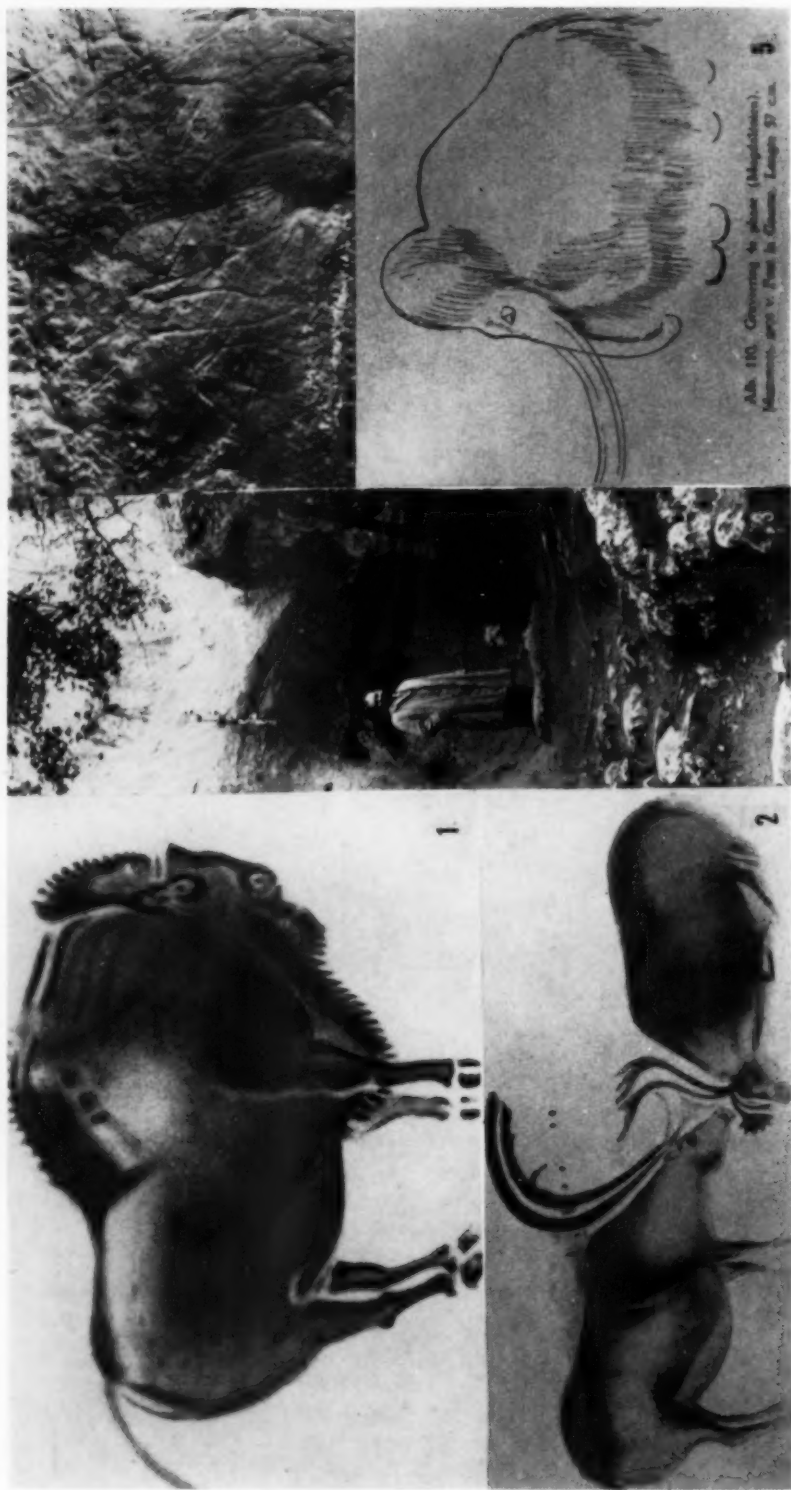
They represent animals which have lived in the south of Europe during the last glacial age, such as the hairy mammoth, the hairy rhinoceros, the bison, the hole-bear, the hole-lion, the wild horse, the reindeer and many others. Most of them have long since died out or like the reindeer (photograph No. 2) have wandered to the north of Europe, following the ice when it began to withdraw at the end of the ice period.

The people who made those pictures of them must have lived at the same time, they must have seen them and they must have observed them well to be able to make such natural and lively portraits of them, by memory, deep in the holes of the pitch dark caves wherein they lived.

But at that time the general opinion about the origin of such art was, that it could only be found in historical times and that the beginning statures were geometrical figures and patterns taken from pleating and weaving. But here were real pictures, painted in colours with such highly developed craftsmanship, that they could be called real works of art, even from our modern point of view. How could it be possible that prehistoric people, cave-dwellers living in the stone age, could have made such wonderful paintings? That was absolutely unthinkable at that time and indeed all the prominent scientists declared unanimously they were modern falsification. When Don Sautuelo insisted, one single expert, Mr. Harle, came to Altamira and after a short examination also declared them to be modern paintings. At a large congress at Lisbon in 1880 where all the big shots of prehistoric research were present, the same judgment was given. After that Altamira was never more mentioned and the wonderful pictures were forgotten. However the prehistoric research work went on, and many caves, not only in France and in Spain, but in many other countries of Europe were explored, not in the intention to find pictures, but to get an idea of the life of these cave-dwellers who might have been our ancestors.

Already in 1868 some fossil skeletons had been found by chance when the railway from Perigueux to Agen was being built. Three men and one woman with an unborn child were found in a cave together with the bones of the mammoths which have lived in the last ice-time. This was near

Pre-historic pictures from the caves of Altamira and Font de Gaume



No. 1, BISON, CAVE OF ALTAMIRA; No. 2, POLYCHROME, PREHISTORIC REINDEER, CAVE OF FONT DE GAUME; No. 3, ENTRANCE, CAVE OF FONT DE GAUME; No. 4, HOLE-BEAR, No. 5, Hairy MAMMOTH, CAVE OF FONT DE GAUME.

Cro-Magnon in the south of France. So the race to which these skeletons belonged was called the Cro-Magnon race. In the following years more than a hundred skulls and skeletons of this race were found, all over Europe but mostly in the caves around the Pyrenees. The skulls and bones of these Cro-Magnons are nearly identical with those of some northern races living now. Also many thousand pieces of articles which these people used, weapons, tools, etc., were found. They can be seen in museums all over the world.

By the study of all this material, which the geologists can date fairly well, the paleologists could reconstruct the life and the development of these Cro-Magnons throughout the many thousand years of their existence, that is from about 26,000 to about 10,000 years B.C.

In the remotest times they had only weapons and tools made of firestone. Later they also used the bones of mammoth and bison and the horns of the reindeer. Still later they decorated their objects of use with engravings which they made with the point of a hard stone. First they only made lines and scratches; later these engravings represent the contours of animals or of animals' heads and sometimes of human beings. These are much more seldom and the designs are not so natural as those of animals. Some have animal heads and claws, so that they suggest some magic rites such as we know from now living primitive people. Pieces of bones were found with engravings and a hole at one end, so it became obvious that they were worn as amulets or as ornaments. On the skeletons which were found in some caves were found rows of teeth of the hole-bear, which were perforated at one end, round the neck and the arms of the skeletons, and sometimes stone knives and other objects. So the Cro-Magnons already had burial rites.

They had no other home than the caves which protected them from the cold and the wild animals. Their life must have been a constant fighting against these ani-

mals, they had to kill or to be killed. They were hunters. They had no agriculture (during the ice-age the climate in the south of Europe was so as it is now in the north) and no domestic animals, no weaving, no pleating, not even pottery. They probably clad in animal hides because needles made of splinters of bones were found. Of course they had fire like all human beings however primitive have, but which no animal has. They could even light their pitch-dark caves with artificial light, for hollow stones and bones were found, containing fat, which can have served as a kind of primitive lamps.

In later times they lived with and from the reindeer much like the Lapps do nowadays. It is therefore possible that when the reindeers wandered off to the north the Cro-Magnons followed them and so became the forefathers of now living northern races.

That these Cro-Magnons were exceptionally talented could already be seen from the sometimes beautiful decorations of their objects of use. But the great surprise for the scientists was still to come.

In 1901, just 26 years after the discovery of the cave of Altamire, another discovery was made which brought quite a sensation to the whole civilized world and which caused the opinions about the origin of art to be radically altered.

This was when the caves Les Combarelles and Font de Gaume were discovered and explored. These caves are also situated in the south of France near the little village of Les Eyzies in the Dordogne, where there are many caves in the rocks on both sides of a small river. (The photograph 3 shows the entrance of the cave of Font de Gaume.) Both caves consist of long, narrow and not very high corridors, which one can follow some hundred meters deep in the rock. Probably they are old river beds.

The interesting discovery was that all along these corridors there were found engravings on the walls, much the same as those already known from the tools and weapons of the Cro-Magnons. They are

engraved in the walls and on the ceilings of the cave with a sharp hard stone on the softer limestone and they represent mostly the contours of the same animals or animals, heads as those on the objects of use. At first they are difficult to recognize as you can see on the photograph of the hole-bear (No. 4), but if you have learned to see them you distinguish more and more. In Font de Gaume there are counted more than 300 engravings, 80 bisons, 40 wild horses, 23 mammoths, 17 reindeers, 2 rhinoceros, 1 cave-bear, 1 human figure, and so on. The pictures are often engraved tippy-turvy (see photo) using the natural unevenness of the rock and often one upon the other so that the one underneath must be the older. But—and this is the surprise!—there were also found some *painted* pictures, which were very like those of Altamira! Photograph No. 2, the 2 reindeers, shows one of these pictures. They were even painted with the same colours as the "falsifications" of the cave of Altamira, red and yellow with ochre that is found naturally in the rocks of the caves, black (charcoal) and white (chalk). On some parts of the pictures stalagmites had grown during the ages, which was an evidence more of their genuine old age. But no other evidence was necessary, because by comparing these pictures with all the engravings which had been studied and dated during the past 26 years the polychrome pictures were evidently the culmination point of this art. The whole evolution from the first beginning to this highest point, the polychrome paintings, was now clear. It could be classified and dated. The paintings are about 15,000 years old.

Now Altamira was again remembered and the "falsifications" came again in the center of interest. All the big shots of prehistoric science now visited Altamira and the real old age of the pictures was now certain. The only expert who had examined the paintings on request of Don Sautuolo, Mr. Harle, even regretted his error of 26 years ago in public.

The Abbe Henri Breuil, a great connois-

seur of prehistoric art, made water color copies of them and published a big book on Altamira and another on Font de Gaume (from these the photographs in this article are taken).

Both caves are now world-famous and many people travel far to see them. Altamira was even called "the Sistine Chapel" and Font de Gaume "the Louvre of prehistoric art."

Who can tell what more surprises there are perhaps still hidden in the ground, waiting to be discovered!

MAN, TIME AND FOSSILS, THE STORY OF EVOLUTION, by Ruth Moore. Knopf, 411 pp., \$5.75.

Modern science has thrown new light on evolution, and Miss Moore, a Chicago newspaper reporter, has done an able job of expressing the various contributions of anthropologists, chemists, geneticists and physicists to the long story of man's beginnings.

The book is made up of three parts. The first discusses the development of the theory of evolution as reflected in the thinking of such men as Lamarck, Darwin and Cope. The second brings together what is known or conjectured about human fossils, and the last reviews modern attempts to date ancient events more accurately through such techniques as radiocarbon analysis and measurement of the infiltration of fluorine into fossil bone.

One result of this research is that the earth is now known to be older and man younger than had heretofore been supposed. Anthropologists now assume that this means that man could evolve from his ape-like ancestors more quickly because he had less change to make than was previously believed necessary.

As an introduction and a readable one, to modern evolutionary thinking, this is a book to be commended.

—R. P. MACFALL

Nature Heals Spoil Banks — Hides Spoils

by DR. BEN HUR WILSON

BOTH AMATEUR and professional geologists, while delving into the earth's great storehouse in search of mineralogical and paleontological specimens, for the purpose of prying into nature's secrets, have always taken advantage of the erosional work of streams and rivers to uncover material for which they are seeking. In some instances, however, they do it the hard way, by pick, crowbar and shovel.

In more recent times, their job has been made far easier by taking advantage of work sometimes done by wholly disinterested parties, excavating for buildings, in the construction of railways and highways, or in quarrying and mining operations of all kinds.

Regardless of what may be thought or said concerning the destructiveness of large scale strip mining activities throughout the country, these operations have proven to be of inestimable value to both geologist and collector. Here the surface of the earth has been ripped open and the sub-surface exposed over hundreds of thousands of acres, thus revealing it to the eye of man in a way which no other forces could possibly do in so short a time.

On the whole, however, only a small portion of these vast areas, located in practically all central States, have ever been looked over by the searching eye of the collector. The job is far too big, and their numbers far too small, to search them all. Furthermore, much of these areas never will be scanned for collecting purposes for nature herself will soon go about to repair the damage done by man.

Even the strip mining companies, themselves, have organized reclamation programs to restore vegetation on these churned-up shallow coal lands, or "spoil banks" as they are called locally by miners and collectors. Well named we would say. A small portion will be suitable for pasture and grazing, but for the most part they will lend them-

selves only to reforestation.

In the famous Wilmington area of northern Illinois, organized effort is being made, sponsored by THE EARTH SCIENCE DIGEST, to preserve the famous collecting grounds for the fossil hunters. Even the owners themselves, the Northern Illinois Coal Corporation, have taken a favorable attitude and have never barred or posted the area against trespassers, except for certain parts which have been leased to private or public interests for recreational and other purposes.

Collecting here is to be encouraged, especially by those with scientific attitude, who will preserve and not waste valuable specimens, for within ten or a dozen years most of the "spoil banks" will be recarpeted naturally by plants and humus, and thus reducing to a minimum the possibility of much further recovery of specimens.

YOUNG GEOLOGIST STRIKES IT RICH

A young geologist says he has struck an unusually high grade of uranium ore in southeast Utah, and a business associate says it may prove to be of utmost importance.

Geologist Charlie Steen, 33, said he has hit a mass of pitch-blende, "primary ore—the kind of stuff that's needed to make our atomic defense program the best in the world." He heads Utex Exploration Co., Inc.

His Albuquerque business associate, James Davenport, independent oil man, said Steen "believes he has opened something that could prove of tremendous importance to the nation's atomic program."

Steen's claim is on land facing Big Indian valley in southeast Utah. In an interview, he said, "We aren't even touching the top grade supply yet, but we are able to ship 30 to 40 tons of ore a day to the U. S. Vanadium Corporation at Thompson, Utah."

The Largest Known Mass of Native Iron in Basalt

by RUSSELL A. E. MORLEY

A description of the two largest masses of native iron in basalt from Bühl Mountain, Germany: The largest known mass is preserved in the Morley collection, and weighs 5,481 grams. The second largest mass of 4,331 grams is in the collection of the Department of Mineralogy of the British Museum (Natural History) in London. Both masses of native iron in basalt were secured from Dr. F. Krantz of Bonn, Germany, and are known to have been collected many years ago.

In May, 1953, I secured by purchase from my friend Dr. F. Krantz of Bonn, Germany, the largest known mass of native iron in basalt to date reported from Bühl Mountain, near Weimar, southeast of Kassel in Hessen-Nassau, Germany. Regarding this iron, Dr. Krantz informs me that the date of its discovery and the name of the discoverer along with other pertinent data were lost when files containing these important records were destroyed during the war; however, the specimen is known to have been purchased from a collector many years ago.

The ellipsoidal mass (see Figs. I & II) has a weight of 5,481 grams with an overall length of 242.16 mm., a width of 159.06 mm., and a breadth of 103.90 mm. A small area to the right of the center (see Fig. III) has been polished to show how the amoeboid shaped grains of native iron are disseminated throughout the basaltic matrix (also see Fig. IV). The entire surface of the nodular mass is stained various shades of brown from the oxidation of both the native and the chemically combined iron of the basalt. This unique specimen is now preserved intact along with 4 smaller masses of Bühl iron, in the Morley collection under catalogue number 2370.

The other known mass of Bühl iron of similar size is deposited in the collection of the Department of Mineralogy of The British Museum (Natural History). According to a letter received from Dr. L. J. Spencer, dated July 19, 1953, the largest of the 8 specimens of Bühl iron preserved in the collections of the British Museum is a mass of 4,331 grams, when purchased from Dr. Krantz, in 1949, was considered to be the largest in existence. A letter received from Dr. Max H. Hey, of the Department of Mineralogy, dated March 4, 1954, gives the following information: "Our largest specimen of native iron from Bühl Mountain, Germany, measures 20.9 x 13.4 x 10.5 cm. and is roughly ellipsoidal; the present weight is 4,331 grams" (see Fig. V).

The new 1954 revised edition of Klockmann's *Lehrbuch der Mineralogie*, by Professor Dr. Paul Ramdohr, page 307, gives the maximum weight recorded to date for a nodule of native iron bearing basalt from Bühl Mountain as 5 kgs. This new value was based on information supplied by Dr. Krantz, prior to my purchase of the iron.

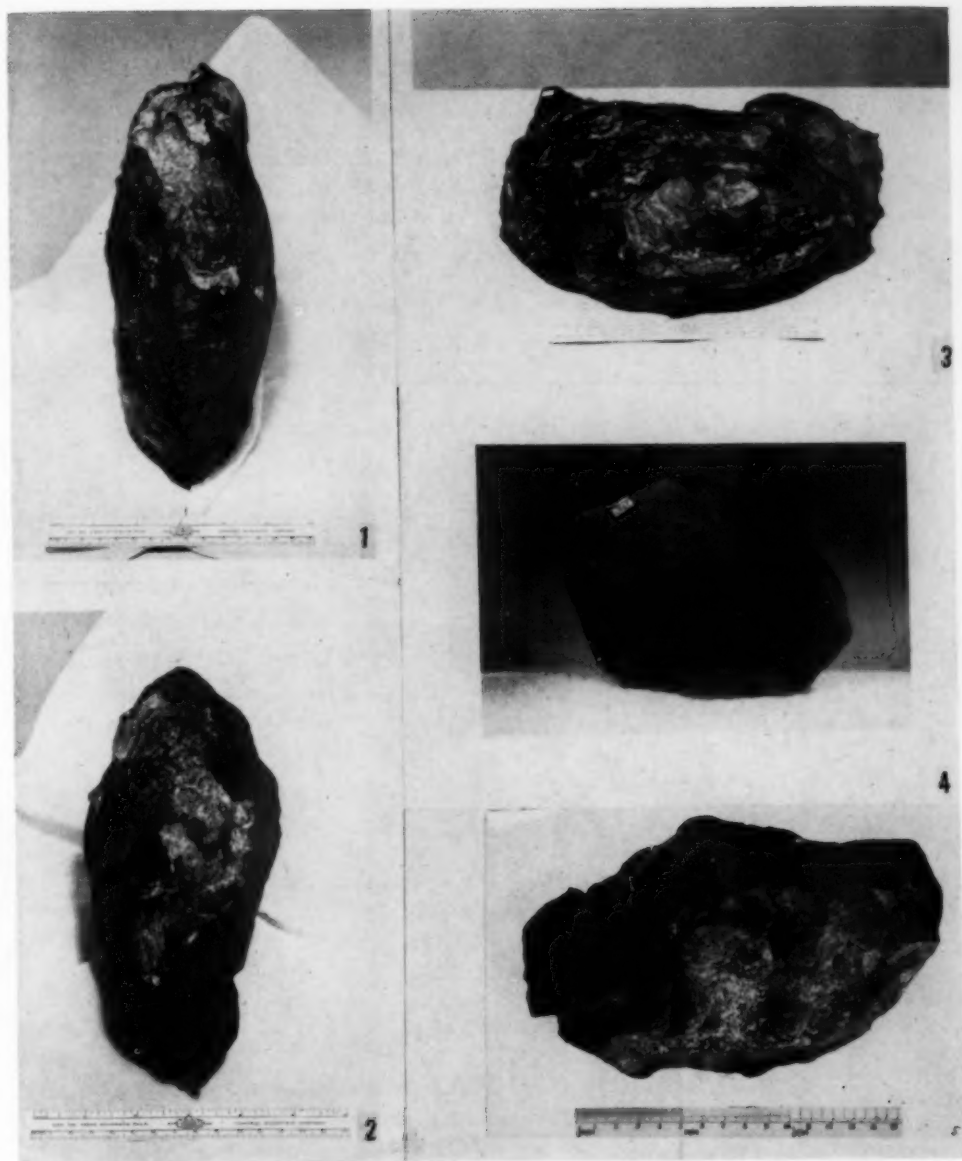


Fig. I: Side view of 5,481 gram nodule of native iron in basalt from Bühl Mountain, Germany, showing typical ellipsoidal character.

Fig. II: End view of 5,481 gram nodule of native iron in basalt from Bühl Mountain, Germany, showing typical ellipsoidal character.

Fig. III: Top view of 5,481 gram nodule of native iron in basalt from Bühl Mountain, Germany, showing typical ellipsoidal character.

Fig. IV: 1,143 gram basalt nodule from Bühl Mountain, Germany, with a polished face showing amoeboid shaped grains of native iron.

Fig. V: 4,331 gram nodule of native iron in basalt from Bühl Mountain, Germany, in the collection of The Department of Mineralogy, of The British Museum. (Photograph used by permission.)

Cedar Rapids Man Improved On Ancient Millstones

by BOB KENYON

BUILDING BETTER MOUSETRAPS isn't his line, but Matt Macek of Cedar Rapids, Iowa, has done the same kind of thing with his improved design of an article which has held an important place in the civilized world much longer than mousetraps.

Millstones are his specialty, and it may come as a surprise to some that millstones are still used in this day of modern indus-

remains the best method ever found to mill corn. Indians and ancient man before them practiced the art throughout the ages.

He has engineered some improvement, however, on the centuries old millstones and holds patent rights on his refined product, obtained some years ago. Modern industry, ever keen to grasp new and improved ideas, was quick to take advantage of his improvement.



GRANITE for Matt Macek's Millstones is taken from the earth at this quarry near St. Cloud, Minnesota.

trial progress. Millstones once used in the hundreds of pioneer grist mills run by early settlers of Iowa and other Midwest states are now the prized possession of their fortunate owners, in parks and on the lawns of lovers of local history.

The Cedar Rapids man, who has been associated with the milling of corn for more than 40 years, says that the old fashioned way of rubbing two stones together

For many years Macek was the head miller at the Penick & Ford plant of the famous Cedar Rapids corn products manufacturing firm. It was here in the company's shop that he first put his ideas to use and designed a better millstone. At least Penick & Ford and the starch plants at Keokuk and Decatur think that the Macek stones are better. All three of these big mills and many other plants are now using his im-

proved design.

One unique feature of Macek's millstones are adjustable wooden paddle boards in the upper or revolving stone. These can be adjusted to vary the amount of corn forced through the mill. This of course is a betterment which must appeal to every miller large or small.

Old type millstones, with stone grooves instead of wooden fan blades, can grind about 4,000 bushels of corn in 24 hours, while the improved corn mill will handle approximately 9,000 bushels in a 24 hour day, more than doubling the output.

From early days, many plants use millstones made of several pieces, shipped from France and fitted together in one finished grinding piece, by using iron bands and racks of various types.

Macek's stones pictured here are rough cut from a solid piece of granite weighing approximately two tons. They are quarried and cut near St. Cloud, Minnesota, and the rough stones employed for the huge stone "doughnuts" are valued at nearly one thousand dollars a pair.

The stones are 54 inches in diameter with a grinding face 15 inches across. The large hole in the center is partially filled with cement, into which are anchored the wooden paddles (in the revolving stone.)

Each millstone is a foot thick, backed with concrete to make a total thickness of 20 inches. Two steel bands are welded around the stones to keep them from flying apart under the stress of rotation.

The running stone has to be perfectly balanced with four lead weights, as it turns at 400 revolutions per minute. Turning power comes from a belt pulley run by a 75 horsepower electric motor.

The grinding surface of each stone has one-quarter inch deep grooves a half inch apart, there being approximately 360 of these radial cuts around the stone face. They are scored with an air hammer and chisel.

It takes Macek about a week to complete a set of millstones, and the normal life of a set is seven years. The grinding surface

has to be regrooved, however, after about every 12 to 20 days of use, but this task is easier than the initial cutting.

PRASIOLITE—A NEW GEMSTONE

Recently a clear, green quartz has made its appearance in the gem trade. It was discovered in the State of Minas Gerais, Brazil, in a region which produced only amethyst and citrine. The quality of these was never sufficiently high to make them competitive items with the better products, and the region remained more or less unknown.

The story goes that a small quantity of the poor grade of amethyst was thrown into a campfire, and a surprising change in color took place in the discarded stones. Then followed a series of extensive systematic experiments in "burning" until a dependable method was found to turn the indifferent amethyst a beautiful green. The name Prasiolite was then selected.

It is said that the source of the material is abundant, so that it is to be expected that Prasiolite will pass through the regular channels into the general jewelry trade.

Dr. Frederick H. Pough has pointed out that there has long been recognized a need for a green gemstone with a strong appeal to the gem-loving public. This stone is expected to fill this vacancy and to take its place in the line-up of the other quartz gems, in availability and also in price. There are said to be present abundant supplies in a large area, partly on the surface and partly underground. Only about 4% of the amethyst is suitable for proper heat treatment, which is a highly delicate procedure. The color of the treated stones is said to be similar to that of green beryl, and may approach that of green tourmaline. Occasionally a peridot-like color of great beauty appears.

Efforts are now under way to get the stones mined and "burned," after which they are cut in Brazil. Production and marketing are under strong control. Perhaps the 1954 Christmas trade will have them available.

—J. DANIEL WILLEMS

Early Gold Mining in New Hampshire

by MRS. JULIAN WETHERBEE

THE FIRST KNOWN RECORD of the discovery of gold in Lyman, New Hampshire, was made by Professor Wurtz, of New York, in August, 1864. He visited this same locality again in September and also in December, 1866, sending several specimens of galena to be assayed, requesting they be tested for gold as well as silver. One sample contained gold at the rate of 1.006 oz. to the ton.

Professor Wurtz suggested this district, in the towns of Littleton, Lyman, Lisbon, Bath, Monroe, Landaff and Haverhill be called the Ammonoosuc Gold Field. (In New England states the word town signifies a political division equivalent to a midwest civil township.)

The history of the field presents, probably for the first time, the peculiarities of a first discovery in solid rock and not, as usual, by tracing up of gulch gold to its home in the lodes. Although there was considerable prospecting over this entire area most of the gold produced came from the towns of Lyman and Lisbon with the Dodge Mine, in Lyman, probably the largest producer.

In 1865 a Mr. Allen and Mr. Knapp discovered free gold on the David Atwood estate in Lisbon. This led to the organization of the Lisbon Gold Mining Company in February, 1866, with a capital of \$240,000. Before this organization, a little work or prospecting had been done, with three excavations made in the vein. The first was in a swampy place on George Brook. This was a shaft about 94 feet, the first 35 feet vertical and the remainder made at an angle of 45 degrees or more. The greatest amount of free gold was found within 25 feet of the surface. The gangue of the vein is quartz, containing pyrrhotite, with a little copper pyrites or chalcopyrite.

The assays of the rock is said to indicate at least \$60 a ton. It is probable the pyrrhotite contained gold, as the best specimen showed free gold intermingled with it.

The second opening a few rods up the hill, on the south bank, was sunk 30 feet. The third was much farther south and the shaft was only 25 feet deep. All the openings indicated a vein over 4 feet in thickness, bounded by a hard quartzite resembling gneiss.

This company was not very successful in extracting the gold from the ore and stopped their operation in December, 1866. They allowed the mine to fill with water. Then later, they bought one-half interest in what is known as the Dodge Mine.

In June, 1866, Mr. J. H. Barrett, while working on the Dodge farm in Lyman, discovered a stone projecting from the wall which contained a yellow substance resembling gold. The specimen was sent to S. K. Fisk, of Lisbon, who pronounced the mineral pyrites, but upon his cleaning the specimen he discovered a sprinkling of gold, the finest specimen found up to this date in New Hampshire. This discovery led to a search for the vein. Three or four shallow openings were made; then an association was formed to work half of the property, known as the Dodge Gold Mining Company, with a capital of \$75,000.

The Lisbon and the Dodge companies worked this mine jointly in the early part of 1868. Each transporting its share of quartz to the mills at Lisbon. The Dodge mill started operation in March, 1868, on the north side of the river. Each mill had 10 stamps and was capable of crushing and amalgamating 8 tons in a 24 hour period.

The history of the operations of the Dodge and Lisbon mines was varied. The Dodge Company worked the mine and milled the quartz till the last part of 1869. B. F. Martin, the president, stated the sum of \$24,500 was obtained while it was under his management. For 6 months from December 1869 to June 1870 the property was leased by E. L. Hall and John McCall.

Fay and Wilmath next leased the property for 6 months in 1870 to 1871, and it is thought they took out \$2,000 worth of gold. In 1873 Dr. J. H. Rae leased the property and applied a process of his own to the separation of the gold from the quartz. He claims to have taken out \$3,500 in July and August of that year. Dr. Rae said they obtained \$6,500; others claimed about 30 tons a week of ore, valued at \$12, for 26 weeks, making over \$9,000. Dr. Rae found an average of \$25 a ton at first, then later \$18 a ton was obtained. Up to the time of the formation of the Electro-Gold Mining Company the entire amount of gold milled was \$36,570. Dr. Rae says it was proper to add \$5,000 to this amount for supposed stealings and half as much for specimens carried away.

The Electro-Gold Mining Company worked the mine and the mill successfully for 2 or 3 years. Dr. Rae said, "Our ore has averaged \$19 per ton. The ore varying from \$1.25 a ton up to \$95 a ton."

The Dodge Mine was leased for a time to J. H. Paddock & Company from March 1, 1874. They used the mill on the east side of the river at Lisbon.

The director of the U. S. Mint reports the receipts of gold from New Hampshire for the year ending June 30, 1875 to be \$5,200.92. The next year in 1876 the report was for \$2,731.74.

The total amount of gold extracted before 1876 was close to \$47,000, but at that time gold had a value of \$20 an ounce, while now it is \$35. In present day figures the value would be over \$80,000.

The tract of land occupied by the Dodge and Lisbon Companies, is about 170 acres in the east part of Lyman. The land was divided into 500 foot sections and the southern end was owned by the Dodge Company with the Dodge owning every other section.

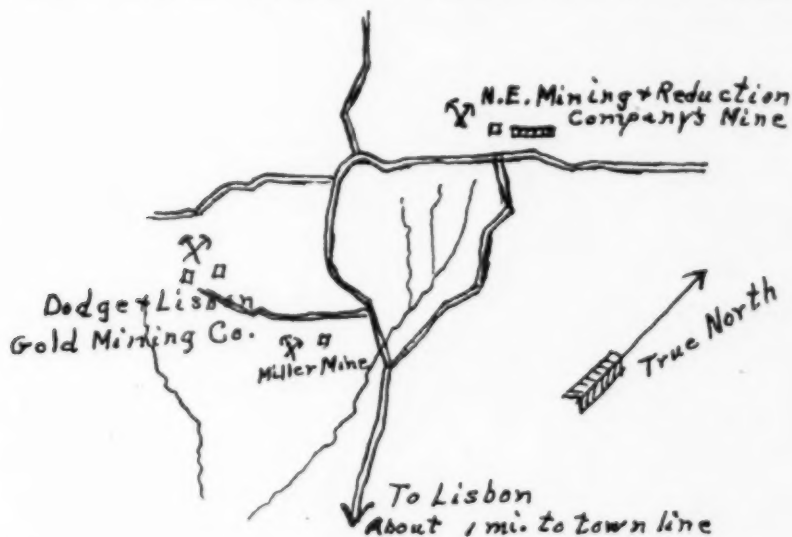
The formation carrying the auriferous veins of this type has been described as the Cambrian Clay Slate. The quartz is somewhat glassy, whitish, except where it is stained by decomposed pyrites. Masses of slate, crystals of pyrites, anker-

After 1869, 3 shafts were made in the vein, two of them were 100 feet and the third about 50 feet. The quality of the rock at different parts of the shafts was not uniform.

Some who had been engaged in milling the quartz became discouraged with the small yield.

The method of extraction first was the ordinary stamp process, with 10 small stamps, lighter than usual, with copper and blanket amalgamation. There were two of these mills, one each side of the river in Lisbon.

With the starting of the Electro-Gold Company the Thunderbolt crusher replaced the stamps. The rock was heated or partly roasted, then crushed to a dry powder and placed in cylinders with water and quicksilver, 30 pounds to a ton of ore. The cylinder revolved for 4 hours and the sand flowed into dolly tubs, after passing over blankets. The sulfides were caught in the tub and saved for further treatment. The



ite and galena are scattered through it. It is common to find spangles of free gold in the quartz.

The gold obtained from the Dodge mine is very pure; returns from the mint average 916.8 parts of gold.

The shaft was sunk 17 feet in 1867 and the rock taken yielded \$6.25 per ton in the mill. After that the whole vein, on both sides was excavated for several rods to the same depth, the rock yielding \$3 or \$4 per ton. After that they returned to sinking the original shaft and the yield for about 2 years was nearly the same.

The shaft was excavated to a depth of about 70 feet in 1869 and there are drifts 60 feet in both directions. The vein being 16 feet wide, the rock from this depth seemed to be more productive.

blankets catching the gold were changed every 4 hours. The mill could treat 5 tons of rock in 10 hours. This was the most successful of all the methods tried in New Hampshire.

A few other veins similar to the Dodge occur in Lyman and vicinity. One of the most noted is the Bedell mine about 1 mile farther west. The mineralogical character is the same. The vein is 2 feet wide. Specimens showing free gold were easily obtained. An assay in 1869 showed \$12 of gold to the ton of ore. There is more galena in the vein, carrying also \$33 of silver to the ton along with the gold. The shaft here was only 20 feet deep. For some unknown reason this mine was not explored to a greater depth.

Near the Haviland Copper Mine is the Hartford or Moulton mine. A shaft of about 100



ONE OF THE GOLD MINE DUMPS

feet was sunk and at the depth of 23 feet the quartz vein assayed \$30 in gold to the ton of ore.

Besides the mines mentioned there were many more smaller gold mines in this district, that were worked before the turn of the century.

Another such mine, near the Dodge mine, is called the Miller mine. The dump can still be seen from the main highway, the tunnel going into the side hill for some 20 feet. Today you can see the old tracks emerging from the mine. Quite a bit of debris is at the entrance to the tunnel. I have not ventured into the mine but talked to Mr. Marshall, of Lisbon, who mentioned he had been in the tunnel on different occasions.

One of the curiosities of New Hampshire mining has been illustrated by the history of the Grafton Gold Mining Company. It was organized at the first of the year of 1869. The property is near the west corner of Lyman. The mine was first known as the Davis and Thayer Mine, then as the Wiggins and Davis. It lies on the east side of Gardner's Mountain. The rock is dolomitic and somewhat slaty. At the surface were 3 veins, each about 1 foot wide, showing narrow platy partings, which became smaller at 25 feet, and disappeared at 76 feet, this being the bottom of the shaft.

The vein is of limpid quartz with many quartz crystals, dolomite or ankerite, iron pyrites and galena besides free gold. The gold was more abundant in the upper vein.

From early assays the following was given; \$7 of gold to the ton of rock; and at the depth of 76 feet from 50 pounds of rock Dr. Torrey, of New York, obtained gold at the rate of \$62.17 to the ton. On examination the pyrites showed no gold. About 40% of the gangue is quartz, the rest being chiefly dolomitic.

A sample examined by T. C. Raymond gave

the following analysis: Lime 20.6; silica 30.3; Protoxide of iron 6.27; magnesia 11.17; carbonic acid 32.11; This composition led the company to believe that if pulverized the rock might be used as a fertilizer, after the gold was extracted. The company did a thriving business in selling fertilizer.

The success of this company led E. C. Stevens, of Lisbon, to put out a similar fertilizer from Lyman, which also had considerable sale for awhile.

Besides the gold contained in veins, the alluvial deposits over a wide area are liable to contain a little gold. The region, however, that has excited the most attention is the so-called Ammonoosuc Gold Field. It contains gold not only in the alluvium but also in quartz veins in the rock. It is evident gold is liable to be found anywhere in this Ammonoosuc Gold Field.

(Parts taken from Hitchcock's "Geology of New Hampshire," published 1872 to 1878.)

SEMI-PRECIOUS STONES, by N. Wooster. Penguin books, \$1.

This small book in an English series similar to our Pocketbooks contains an excellent selection of the extensive lore of semi-precious stones, together with a generous lot of quotations from ancient authors. Curiously enough, one belief, that of the efficacy of amber as a preventive of throat infection, seems to persist widely even today. The author has also dug up a fascinating story about the trick by which King Solomon caused a worm to be captured that would eat away the surface of a gem into the desired design, and he also chronicles that selenite, which splits readily into clear thin sheets, has long been used as window glass.

The most significant discovery is that of turquoise from Cornwall, England, which had lain mislabeled for years in the British Museum until his curiosity disclosed its nature.

The text of the book serves to introduce 16 watercolor plates of gem materials made by Arthur Smith, from British Museum specimens, in the main. As is inevitable, some are more realistic than others, but they and the text combine into a book that will interest anyone who likes to read about as well as pursue his hobby.

—R. P. MACFALL



GEMOLOGY and LAPIDARY ARTS

TUMBLE POLISHING

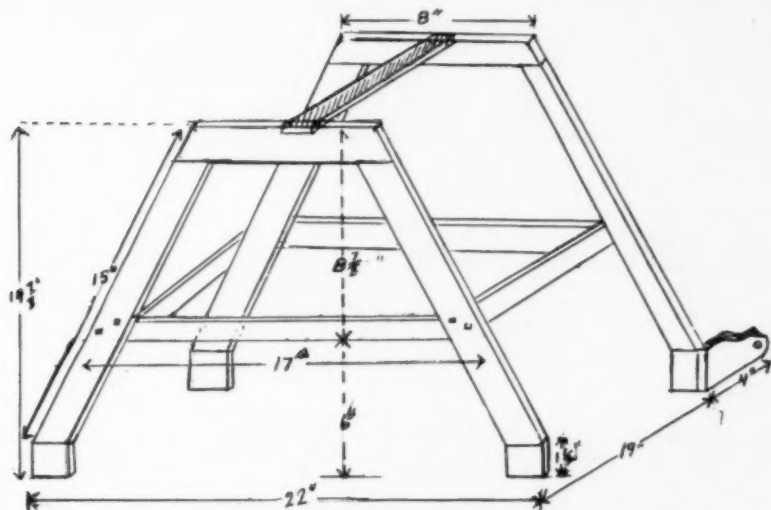
The articles I have read on the mechanics of rock tumbling usually leave out some of the essential points anyone who contemplates building a tumbler will need to know.

In particular one should know the diameter of the drum if the speed is given; or more exactly the peripheral speed. Peripheral speed is found by multiplying the r.p.m. by the circumference of the drum.

and 135 f.p.m. This size motor is ample when drum is fully charged; a reverse electric switch is used.

The drum is rubber lined with $\frac{1}{4}$ " thick rubber. This means the stones really tumble no more than $15\frac{1}{2}$ ". The lining keeps the stones from being nicked by the steel, cuts down the noise, and the drum lasts much longer.

Agate is an acidic rock; therefore much gas is generated with resulting pressure of perhaps 50 p.s.i. Serious injury can result if too much



CARRIAGE FRAME used in making the tumbler device. Dimensions and specifications: Main upright frame $1\frac{1}{2}$ " x $1\frac{1}{2}$ " x $\frac{3}{16}$ " angle; secondary upright frame $1\frac{1}{2}$ " x $1\frac{1}{2}$ " x $\frac{1}{8}$ " angle; horizontal angles 1 " x 1 " x $\frac{1}{8}$ "; (important that bearing that carries drum with overhang be about four times as husky as bearing with chain on end of shaft); drum bearing $1\text{-}3/16$ " Timken roller; chain bearing $\frac{7}{8}$ " ball; chain $\frac{3}{8}$ " pitch roller, enclosed in 24" gauge housing running in oil; Willys transmission was used but Austin or other make is sufficient.

I use a back geared electric motor of $\frac{1}{8}$ h.p. and a three speed transmission, together with a chain reduction of 2 to 1, which gives a final drive of 10, 12, $22\frac{1}{2}$, and $32\frac{1}{2}$ r.p.m. of the drum, which is octagon shaped, 16" in diameter and 7" wide, or peripheral speeds of 41, 50, 94,

pressure is built up. Therefore, an alkaline, non-foaming detergent should be used to neutralize the acid, such as "All" or "Oakite" (probably used by commercial tumblers). Use about an ounce or two at most for 30 to 40 pounds of agate. It is safer to use an indicator, so the



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proper amount is used. A ph of 8 is sufficient.

Until recently the polishing of agate in a tumbler has been considered a trade secret by the commercial tumblers.

Broken emery wheels can be used to cut the covering off large rocks or big projections, or 1" emery balls can be bought commercially. I used 30 mesh silicon carbide, then 220 mesh on the first batch of petrified wood, then a polish. However, that is too much of a jump between sizes.

It is better to go from 30 to 100 to 220, to 440, then polish. Naturally this is more work, as it is necessary to clean thoroughly the tumbler each time a change of grit is made, with resulting better work. Ten pounds of grit were used to 30 or 40 of rock. This seemed to be minimum and maximum capacity for this sized drum. As the grit is much heavier than the clay it may be reclaimed easily if done immediately after each run. Dilute with several volumes of water, mix thoroughly and allow to settle a minute or two, then pour off the clay. Repeat with fresh water. The clay is discarded because it is contaminated with rock dust and is cheap in price.

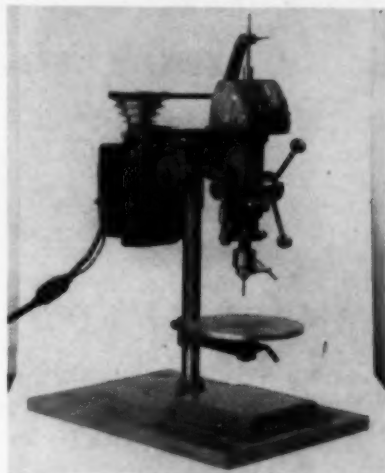
From 16 oz. to 8 oz. of a swelling bentonite clay was used. A lesser amount of the clay was used as the size of the grit decreased. Y-o-Jell does good work. Enough water is added so that when the clay quits swelling every rock is covered. The clay keeps each individual rock covered, with a uniform coating of cutting material, as the grains will stick in the clay film. As the grit cuts the rock, the mixture becomes thicker, for the infinitesimal particles form a clay of their own. Consequently more water must be added after a few hours' run. It should be about the consistency of light cream. Sometimes it is necessary to remove part of the clay. If the clay medium becomes too thick, the smaller rock will float and there is not sufficient movement to cut. Also the clay forms a cushion so the stones will not rattle. It is better to soak the Y-o-Jell overnight before using. Only enough water is used at first to cover the rocks. This leaves space in which additional water may be used to thin the charge.

A good polish was obtained the first try, although there is much to be learned and improvement can be made. A good formula is:

(1) 10 lbs. of an air float (probably 400 mesh) silica grain, with 1 lb. laundry soap, 4 oz. salsoda and 2 ozs. of burnishing liquid, with enough water to make a thin paste that will polish agate, petrified wood and similar material. It must be thick enough so stones will not click.

(2) 15 lbs. of dry grain (pumice will probably do just as well), with 20 lbs. of dry agate

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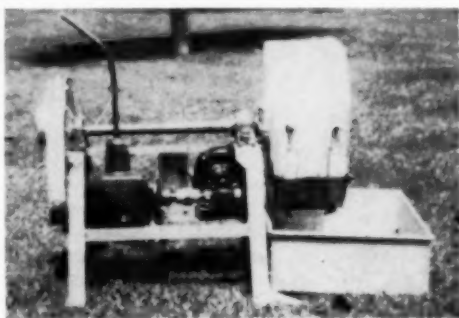
O'Neill, Neb.

also gave a polish. Obsidian and rhodenite did not polish. As with conventional methods, one polish material will not put a gloss on all kinds of rocks.

Tumbling is a slow process, so it will take time to work out a satisfactory formula for the final step, the polish.

Tumbling can be done without a reverse switch or multispeed transmission, but both are much to be desired. If turned too fast in a thin liquid medium the stones tend to chip each other. It seems the high peripheral speed of 135 f.p.m. will be used very little except on very rough work.

Suggestions from other tumbler users will be appreciated.



TUMBLER DEVICE as photographed by author on lawn of his home at Orange, California.

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The Lapidary Equipment Company, of Seattle, Washington, is bringing out two new pieces of equipment. One is the Klimax horizontal shaft lapidary machine for grinding, sanding and polishing, made in two sizes, for 8 inch or 10 inch wheels. The other is the Trimster trim saw, with baked porcelain enamel top surface. The Klimax can be equipped with the Trimster, in such manner that the latter can be disconnected when not in use. Rubber mounted sealed ball bearings make for quiet operation. The Trimster can have either standard or ultra-thin blade, and the porcelain top insures smooth feed.

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OFFICIAL ORGAN OF MIDWEST FEDERATION

THE MILWAUKEE CONVENTION

Once again the annual convention (14th) of the Midwest Federation, held this year on June 24-26 in Milwaukee, Wisconsin, is a thing of the past. But what a past! Where else can you meet so many friends from all over the country and make so many new ones? Where else can you find such enthusiasm for the many phases of earth sciences? Most of the credit was due to the excellent management and advance planning done by the committees of the Wisconsin Geological Society, under whose auspices the show was held, and to the efficient leadership and tireless efforts of Convention Chairman James O. Montague and his fine staff of helpers.

Divided into the two great halls of the Milwaukee Civic Auditorium, the club exhibits in one, the commercial exhibits in the other, and a friendly oasis in between for registration, the guests could choose their immediate interests and enjoy a continuous round of visiting.

Interspersed with field trips, lectures, business meetings, an auction, and occasional visits to the foyer for food and other refreshments, we spent three memorable days that passed all too quickly. Yes, it was hot, but who cared? The evenings were deliciously cool and sleeping fine if you could get to sleep in a hotel with so many friends. Oh, well, this condition can easily be remedied when you reach home.

The club exhibits were quite impressive this year, and it is hoped that after viewing these beautiful exhibits that more clubs will be inspired to participate next year. The tendency seems to run to idea exhibits, which shows that considerable thought and work was expended in an organized manner in order to produce such excellent results.

The commercial booths seemed to be doing a land-office business from the minute they placed their specimens on the tables until packing time. There was a fine variety of gem materials, mineral specimens, fossils, lapidary equipment and books to choose from. Needless to say THE EARTH SCIENCE DIGEST had a booth, illustrating how a magazine is evolved. This booth seemed to be a central visiting place in the hall for tired conventioners and we had

the pleasure of meeting our friends and customers from far and wide.

From all appearances no other group had a better time than the members of the Old Timers Club, which is a national organization affiliated with the American Federation. They send out a regular monthly bulletin, which is eagerly read by members in every state in the union. Dr. Frank Fleener was the regional director in charge, and a booth was furnished him in the dealers' division through the courtesy of the convention management. More than twenty members attended the meetings and five new names were enrolled. All rockhounds over 50 years of age who are interested are eligible for membership, at one dollar per year dues.

During the business meetings there was considerable discussion regarding the flooding of Dinosaur National Monument. The Federation went on record officially as opposing the construction of a dam in that area. This action was unprecedented by the Federation but because of the seriousness of the situation it was considered advisable. All societies were urged to write their congressmen protesting against such action and recommending that this area be changed to a national park, which would make it immune to such a plan as has been suggested. Further, it should be emphasized that there are alternate sites for such a project which would cost less, not obliterate the beautiful, interesting and educational area, and provide even a greater quantity of water for irrigation purposes. A committee was appointed to register this protest in the name of the Midwest Federation.

The new slate of officers for the coming year is as follows:

President: John C. Thornton, Detroit, Michigan.

Vice President: John Griffin, Minneapolis, Minnesota.

Secretary: Miss Bernice Wienrank, Chicago, Illinois.

Treasurer: Orville Fether, Downers Grove, Illinois.

Historian: Dr. Ben Hur Wilson, Joliet, Illinois.

Six new clubs entered the Federation in the past year under the able leadership of Herbert Grand-Girard, bringing the total to thirty-six.

Talks in the various sections included:

Minerals: Nevada and It's Mineral Resources, by S. Vernon Wines.

Archaeology: The Old Copper Culture, by Dr. R. E. Ritzenthaler.

Paleontology: The Fascination of Fossils, by Dr. Katherine Nelson; Silurian Fossils, by Elmer R. Nelson, Jr.

Geology: A lecture by Dr. Walter S. Glock on various phases of geology, liberally sprinkled with a geologist's philosophy.

Lapidary: In the unavoidable absence of the speaker, four well-known Midwest lapidists, Dr. J. D. Willems, LeRoy Peterson, Hazen Perry and Joseph Lizzadro, discussed techniques informally, with Herbert Grand-Girard acting as moderator.

Field trips, official and unofficial, were made to the Milwaukee Downer Museum, Lutz Quarry, and a quarry near Milwaukee that seemed to be infested with trilobites and people who were determined to "rescue" as many of them as possible.

Can hardly wait until next year!

—W. H. ALLAWAY

ORGANIZING A CONVENTION

What makes a convention "click" and some of the pitfalls to be avoided in putting over a mineral show, are a few of the things I would like to talk about for the benefit of others who are to follow in my footsteps throughout the years to come. After having managed many successful conventions and shows for my former employers, throughout the east and central part of the country, and having served as general chairman of the American and Midwest convention in Milwaukee in 1950 and of the 1954 Midwest convention in Milwaukee just closed, I feel competent to speak with some authority upon the subject.

There are two types of conventions and shows. The first is for profit and has a paid secretary and capable assistants to do the work over a period of time, and is backed by a financially responsible organization. The second is that of a non-profit organization which cannot, and would not be allowed, under its articles of incorporation, to conduct a show and convention with paid employees. The Midwest Federation of Mineralogical and Geological Societies falls under the latter classification.

Conventions and their attendant shows do

not just happen, but come into being by careful planning and much hard work. Last year when the Midwest Federation executive committee was in need for some society to act as host and do the necessary work to assure a successful 1954 conclave, a sigh of relief went up when the Wisconsin Geological Society agreed to act as host and to do the necessary work and planning.

The chairman of a successful convention and show, however capable, cannot possibly do the work himself, but must appoint efficient people to head the different divisions and the various committees. He must be sure of their ability to act on their own initiative, and after having planned the work, have faith enough in them to let them do it without interference. He will always have plenty to do bringing up the loose ends to keep him more than busy. Courageous and tireless workers will always bring success.

Harmony in the host society; competent heads of the commercial and non-commercial divisions; a live publicity man; a good treasurer; capable committee chairmen, and close working



JAMES O. MONTAGUE, at the Hartung quarry, Milwaukee, July 4, 1954.

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with the Federation board and that of the host society are absolute essentials to success.

In our case, Oliver Lex, a past president of the W. G. S., willingly accepted the commercial exhibit chairmanship. He contacted over two hundred dealers all over the U. S. concerning the purchase of space in Juneau Hall of the Milwaukee Public Auditorium. By hard work he secured high class dealers as exhibitors, and deserves the greatest of praise for his successful labor.

The chairmanship of the non-commercial exhibit was filled by Gilbert Thill, also a W. G. S. past president. He contacted all Midwest societies regarding space in Kilbourn Hall, and a large number of societies responded and brought in some very splendid material for display. Many favorable comments were made on these displays and Mr. Thill is also to be congratulated on his success.

Dr. W. H. Kuhm, editor of the *Trilobite*, the W. G. S. bulletin, very capably filled the publicity division chairmanship. He worked untiringly to inform all Midwest societies of the welcome and friendship awaiting them upon their arrival in Milwaukee. All of his invitations were filled with that *gemuetlichkeit* so famous in Milwaukee. While Dr. Kuhm was under the strain of a great sorrow, Mrs. Kuhm having passed away a week prior to the convention, he successfully carried on his work.

Our treasurer, Joe Wells, did a bang up job on handling the convention finances and has a report of its great success nearly completed.

Committees appointed within the W. G. S. were Preconvention Ticket Sales; Society Displays; Junior Society Display, headed and worked out by junior members; Registration, all handled by our lady members; Banquet; Banquet Display, and Field Trip. The heads of these committees all proved to be very capable and were ably assisted by the other members of their committees.

The auction was held late in the afternoon of the last day. This was purposely done so the dealers could secure as much business as possible before it took place. The dealers were not solicited for auction donations. William J. Bingham, St. Paul, Minnesota, Jay Farr, Downers Grove, Illinois, and H. R. Straight, Adel, Iowa, acted as an appraisal committee. Herman O. Zander, Milwaukee, and Clell Brentlinger, Chicago, did the auctioneering, all of which produced very successful results.

A convention chairman should welcome criticism but has a right to expect it to be constructive. Those assigned to do the work put in long hours after their regular daily duties and spent money to operate their cars—all without expect-

tation of reimbursement. Those who would criticize should first stop and think of this.

Happily we had no harsh criticism of our recent convention and show, and on the contrary are grateful for many kind words of praise from those attending the Milwaukee conclave.

—JAMES O. MONTAGUE

*

AMERICAN FEDERATION

An outstanding accomplishment of the business session of delegates of the American Federation of Mineralogical Societies, which convened at Salt Lake City with the Rocky Mountain Federation as hosts, June 12-14, was the adoption of a permanent All American insignia for lapel buttons and metal car decals, which may be used by all members of the American Rockhound fraternity, for the purpose of identification.



This is a matter which has been worked on for several years by a committee headed by Charles Preston of Excelsior, Minnesota, and Phoenix, Arizona. The design finally adopted, after slight modification, was submitted by John Mihelcic, of the Michigan Mineralogical Society. Funds have already been appropriated by the Midwest Federation to help defray their share of the expense in getting the preliminary work done in bringing out the insignia.

When every club member in the country can carry the sporty looking metal A.F.M.S. decal above his license plate, our motto will be — "Watch the car ahead of you, he may be a rockhound." This is bound to be very helpful in getting kindred minded people together and acquainted when traveling through the country.

The decals and buttons will be distributed only through the club secretaries, who will order them only for bona fide members entitled to

use them. They will be sold at cost plus a small handling charge, only through agencies authorized by their respective regional Federations. Each Federation will have a designated adopted color, as for instance California, orange; Northwest, green; Midwest, black, etc. This will enable one to tell at a glance as to what Federation is spotted.

New officers for the American Federation for 1954-55 were elected as follows: President, J. Lewis Renton, Portland, Oregon; vice president, Arthur L. Flagg, Phoenix, Arizona; secretary, Harry Woodruff, Washington, D. C., and historian Ben Hur Wilson, Joliet, Illinois. An invitation to meet with the Eastern Federation next year at Washington, D. C. was accepted, the convention to be held probably in October, 1955.

The American Federation is now composed of six regional Federations, the California, Northwest, Rocky Mountain, Southwest, Midwest and Eastern. The Old Timers Club, an over-all group, national in character, is also an affiliated member. The American Federation has no direct control over any of the regional Federations, but acts simply as a steering organization on matters mutually helpful to all. It was organized in 1946 at Salt Lake City and the first convention was held the following year at Denver.

*

MIDWEST CLUB NEWS

BERNICE WIENRANK, *Club Editor*

CHICAGO ROCKS AND MINERALS SOCIETY on June 12 gave a farewell party for its popular charter members, Oriol and Herbert Grand-Girard, who are moving to Santa Fe, New Mexico. The Grand-Girards have been a great asset to the society. Oriol was for six years editor of the club's bulletin, *The Pick and Dop Stick*, and Herbert, who is president of the Midwest Federation, twice served as president of CR&MS. To show its appreciation for the Grand-Girards' constant help and inspiration, CR&MS presented them with a bronze plaque in honor of their many contributions to the society.

NEBRASKA MINERAL AND GEM CLUB is making its own color slides of minerals from specimens belonging to members. Its collection now numbers 40, and 100 more are planned. NM&GC uses these slides for its monthly mineral quiz and to illustrate talks on minerals.

INDIANA GEOLOGY AND GEM SOCIETY on May 14 viewed "The Earth Is Born," the first of several films by *Life* magazine, based on its series, "The World We Live In."

An excellent feature in IG&GS' bulletin, *Geologem*, is its listing of nearby collecting areas, with descriptions of the various mineral and fossil specimens found at each site.

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LOST MOUNTAIN GEMS
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Annual Spring Show, held April 11, was attended by 14,000 people. Forty-four individual exhibits comprised the show, featuring fossils, minerals, gems and Indian artifacts.

EARTH SCIENCE CLUB OF NORTHERN ILLINOIS on June 11 held a panel discussion on the Thornton Dig, which was undertaken by the Archaeology Department of ESCONI during the summer of 1953. The area excavated was the site of a late prehistoric Indian village and burial ground in Thorn Creek Woods near Thornton, Illinois. The dig was under the direction of Miss Elaine Bluhm, member of the Archaeology Department of the Chicago Museum of Natural History, and Mr. David Wenner, formerly with the Smithsonian Institution. A conservative estimate indicates that a total of 1500 man hours was spent in removing tons of sand to recover artifacts and evidence of how Indians lived in the Chicago area about 1500 A.D. In terms of area excavated, this is the most extensive dig in Northern Illinois.

Among the hundreds of bones found in the kitchen midden were many of animals no longer found in Illinois. An abundance of pottery shards and one complete pot were found. Arrowheads and flint scrapers were plentiful. A total of 13 "extended" burials and one "sack" burial were unearthed. The evidence is now being studied and final reports on this project will be placed on record in both the Chicago Museum of Natural History and at the University of Illinois.

EVANSVILLE LAPIDARY SOCIETY on May 23 visited the Posey County Gravel Works, New Harmony, Indiana, where the group found good flint and jasper. The club plans to award a prize to the member who makes the best cabochon from material collected during the trip.

WISCONSIN GEOLOGICAL SOCIETY on April 6 heard Mr. H. R. Straight lecture on "Petrified Woods and their Identification." The talk was illustrated with 60 slides and 400 wood specimens. Taking its speaker's topic as its theme, WGS devoted the May issue of its bulletin, *The Trilobite*, to petrified wood, publishing a total of eight articles on the subject.

CHICAGO LAPIDARY CLUB awarded Edwin Goff Cooke, who is a member of Chicago Rocks and Minerals Society, its first prize trophy for his five piece chrysocolla jewelry set which he entered in the club's 4th annual competitive Gem and Jewelry Show, held May 14-15. This is the third time that Mr. Cooke has won this honor.

MICHIGAN MINERALOGICAL SOCIETY held its annual picnic May 30. A professional caterer was hired by MMS to serve lunch, thereby sparing feminine members the drudgery of cooking and serving, and enabling them to join in the fun, which consisted of picnic games and mineral quiz contests.

NEWS OF OTHER SOCIETIES

COLORADO MINERAL SOCIETY on April 2 featured a program concerning fluorescence, with Mike Gunnell and Ray Thaler sharing its speaker's rostrum. Mr. Gunnell spoke on "The History and Causes of Fluorescence in Minerals," and Mr. Thaler told of his recent visit to the famed Franklin Mines of Sussex County, New Jersey. These mines have produced an array and amount of magnificently fluorescent minerals unparalleled in the rest of the world. Brightly fluorescent specimens of willemite, calcite and rarer minerals from the Franklin mines were displayed by Mr. Thaler.

SAN DIEGO LAPIDARY SOCIETY on May 9 made a field trip to Boulevard, California, where the group collected clear and smoky quartz crystals, asteriated quartz and two pink tourmaline crystals. Twenty-five members, five guests, seven children and one red-backed rattlesnake turned out for the event.

DELVERS GEM AND MINERAL SOCIETY at a recent meeting heard Mrs. HESSIE HARDMAN, secretary of the California Federation, discuss "Jade." Mrs. Hardman displayed her valuable collection of rare and antique jade, explaining why each piece was a collector's item. She also showed inferior minerals which are often sold as jade.

HUMBOLDT GEM AND MINERAL SOCIETY will sponsor a Gem and Mineral Fair on October 2-3 in the Carson Memorial Building, Eureka, California. An outstanding feature among the exhibits will be the world-famous Death Valley onyx dinnerware set.

NATIONALS SPELEOLOGICAL SOCIETY'S 1954 annual convention, held April 2-4, was attended by 196 "cavemen." This figure tops by more than 20 all previous attendance records for NSS conventions.

EL PASO MINERAL AND GEM SOCIETY recently heard Dr. Howard Quinn discuss "Books and Publications of Interest to Rockhounds." Dr. Quinn distributed copies of a list on such publications among the members.

OKLAHOMA MINERAL AND GEM SOCIETY was scheduled to visit the Alabaster Caverns State Park, Freedom, Oklahoma, on June 13. These caverns contain thousands of tons of highgrade, vari-colored alabaster and their walls are studded with glistening gem-like crystals of selenite.

OREGON AGATE AND MINERAL SOCIETY on April 16 heard Mrs. Eric Clark speak on "Archaic Jade." Mrs. Clark, who was born in China and spent much of her life there, illustrated her lecture with rare Chinese jade pieces, many of them dating back to hundreds of years B.C., which she collected while living in China. In 1939 Mrs. Clark displayed part of her collection of Chinese art, including jade, in New

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York. Upon her return to China, this collection was left in the United States and was all that remained to her after her imprisonment by the Japanese during the war.

MINERALOGICAL SOCIETY OF PENNSYLVANIA on May 11 held its annual meeting and field trip in Blue Ball quarry. Highlight of the meeting was the presentation of a scroll and Eastwing hammer to its host for the occasion, John Showalter, in appreciation of his cooperation, good will and love of mineral collectors. Afterwards, the 160 members and friends present collected the following minerals from the quarry: pyrite, dolomite, calcite, rutile, quartz and hematite.

OKLAHOMA GEOLOGICAL SURVEY'S bulletin, *The Hopper*, is currently featuring a series of articles on the geological features of Oklahoma communities and their relation to the economic development of the community. The 1954 spring issue of *The Hopper* is devoted to the Lawton community, an area of 10,000 square miles, in which the city of Lawton is centered.

RECOMMENDED READINGS

FROM SOCIETY BULLETINS

"Pseudo-Images in the Mineral World," by George Smith, June issue of *Sooner Rockologist*. The counterparts of mineral forms are found in life and art. Mr. Smith lists many interesting examples.

"Color Slides of Mineral Specimens," by Art Henry, April issue of *Rear Trunk*. Tips from a professional photographer on how to photograph minerals for color slides.

"The Cullinan Diamonds," by Ed Soukup, June issue of *Shop Notes & News*. The excitement of finding the stone, the tense moment of its first cleavage, and descriptions of the gems cut from it, are all set forth in this engrossing article about the Cullinan, largest diamond ever found.

"About Miniatures," by Claire Kennedy, April issue of *Oregon Rockhound*. Mr. Kennedy, famed for his superb agate miniatures, explains his technique.

"Earthquakes," by H. M. Knight, March issue of *Earth Science News*. You can almost feel the ground roll and toss when you read this vivid account of the 1952 Arvin-Tehachapi earthquake in California.

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catalog, prospecting
instructions and illus-
trations of minerals
in glowing colors.